Ultra-Low Noise Quad Photoreceiver for Space Based Laser Interferometric Gravity Wave Detection, Phase II

Completed Technology Project (2010 - 2012)

Project Introduction

We propose to design and develop 2x2 quad p-i-n InGaAs Photoreceivers having the following characteristics: (a) Active area diameter 0.75 mm; (b) Wavelength coverage 850 to 1700 nm, with responsivity of 0.7 A/W at 1064 nm; (c) Bandwidth up to 20 MHz for the individual quadrant; (d) Group Delay < 6 degrees/MHz; (e) Photodiode capacitance for individual quadrant of <1.5 pF at a reverse bias of 5V; (f) Cross talk between the neighboring quadrants of -45 to -50 dB; (g) Equivalent excess noise per quadrant <2 pA/sq. rt. Hz in the pass band; and (h) Noise Equivalent Power (NEP) due to excess noise <2.9 pW/sq. rt. Hz in the pass band. Six prototype quad photoreceivers will be delivered during the Phase II contract. These devices will be an enabling technology for the success of the Laser Interferometry Space Antenna (LISA) which proposes to detect gravity waves by using a space based interferometric sensor having a baseline of 5 million kilometers. Detection of gravity waves is crucial to our fundamental understanding of nature, including the origin of the universe and experimental verification of the theory of relativity.

Primary U.S. Work Locations and Key Partners

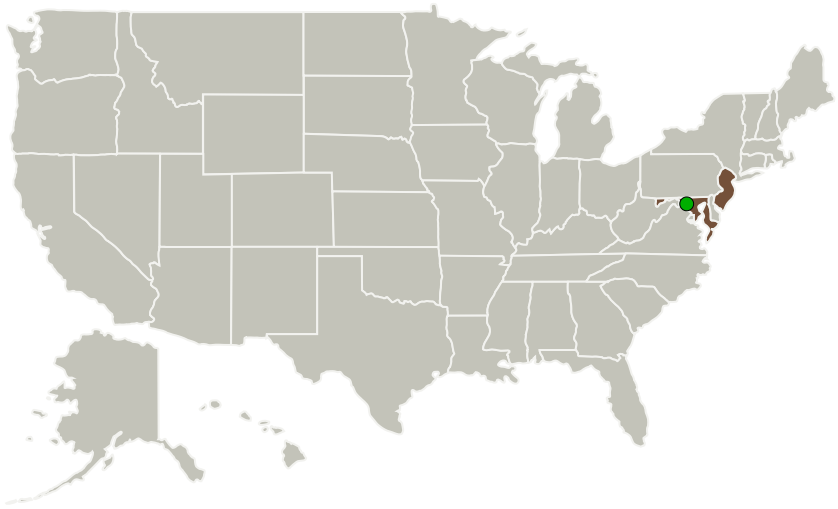

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Table of Contents

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Organizations Performing Work	Role	Type	Location
Discovery Semiconductors, Inc.	Lead Organization	Industry Minority-Owned Business	Ewing, New Jersey
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New Jersey

Project Transitions

February 2010: Project Start

February 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/141184)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Discovery Semiconductors, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

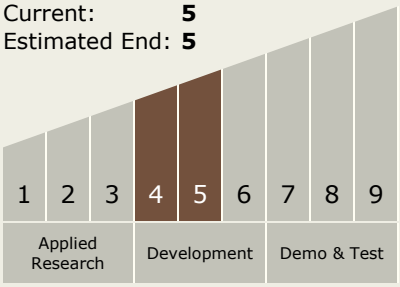
Carlos Torrez

Principal Investigator:

Shubhashish Datta

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Completed Technology Project (2010 - 2012)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System